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(54) Abstract Title
Multi-busbar power track

(57) A modular multi-busbar power track system is disclosed, each module of the system having a plurality of linear busbars within an elongate casing, the busbars being supported and held spaced apart by a spacer. In each module there is at least one access socket into which a tap-off plug may be inserted to electrically connect other elements to the power track system.

Each module has a male connector at one end and a female connector at the other end. The male connector has a number of projecting conducting pins which are internally connected to the busbars and each female connector has a corresponding number of apertures into which the conducting pins of another module can be plugged into. The male and female connectors both have complementary interlocking elements for mechanically interlocking the modules of the power track system together.

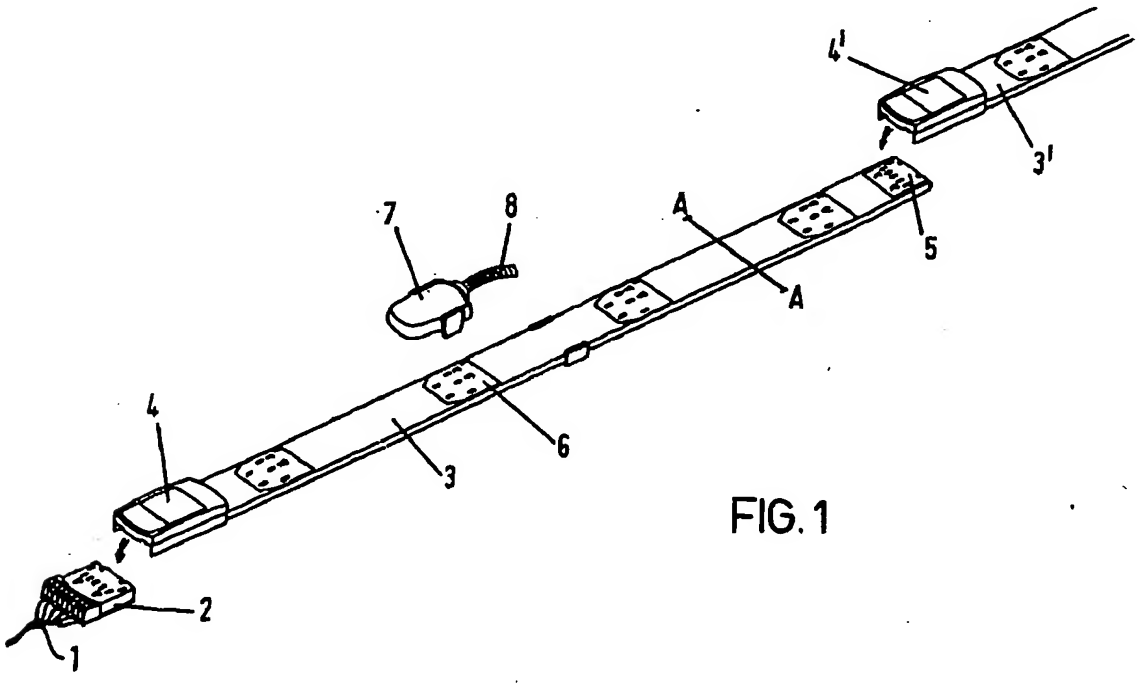

FIG. 1

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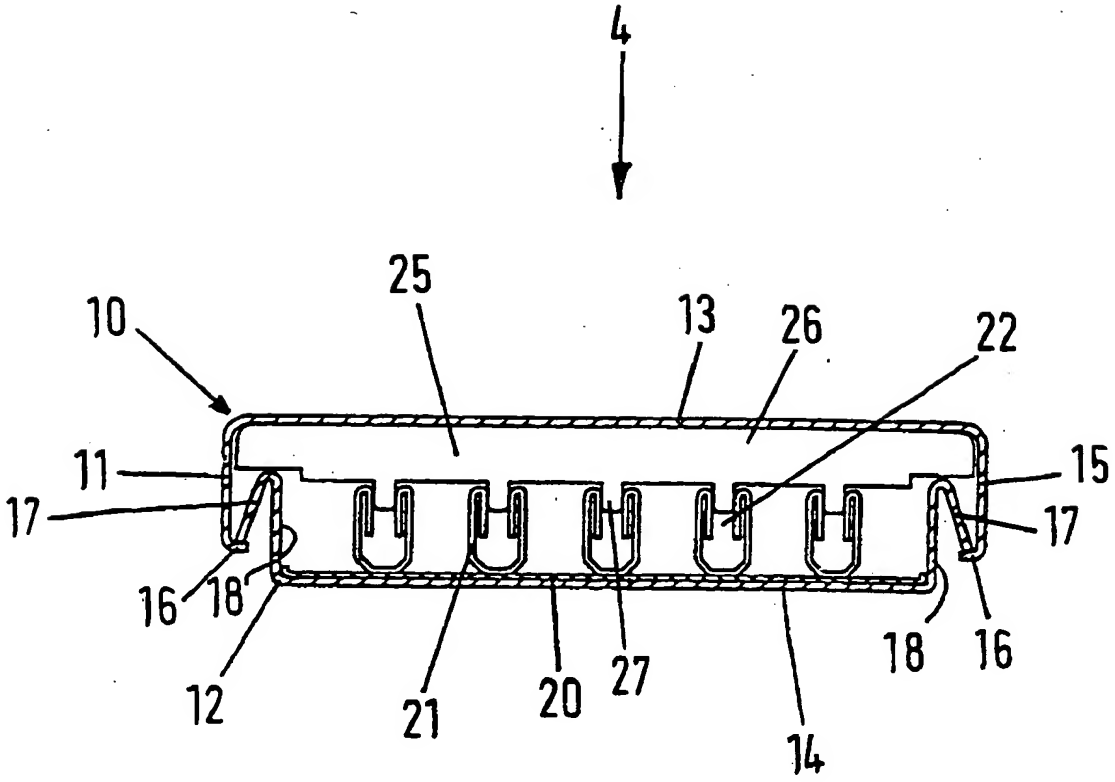
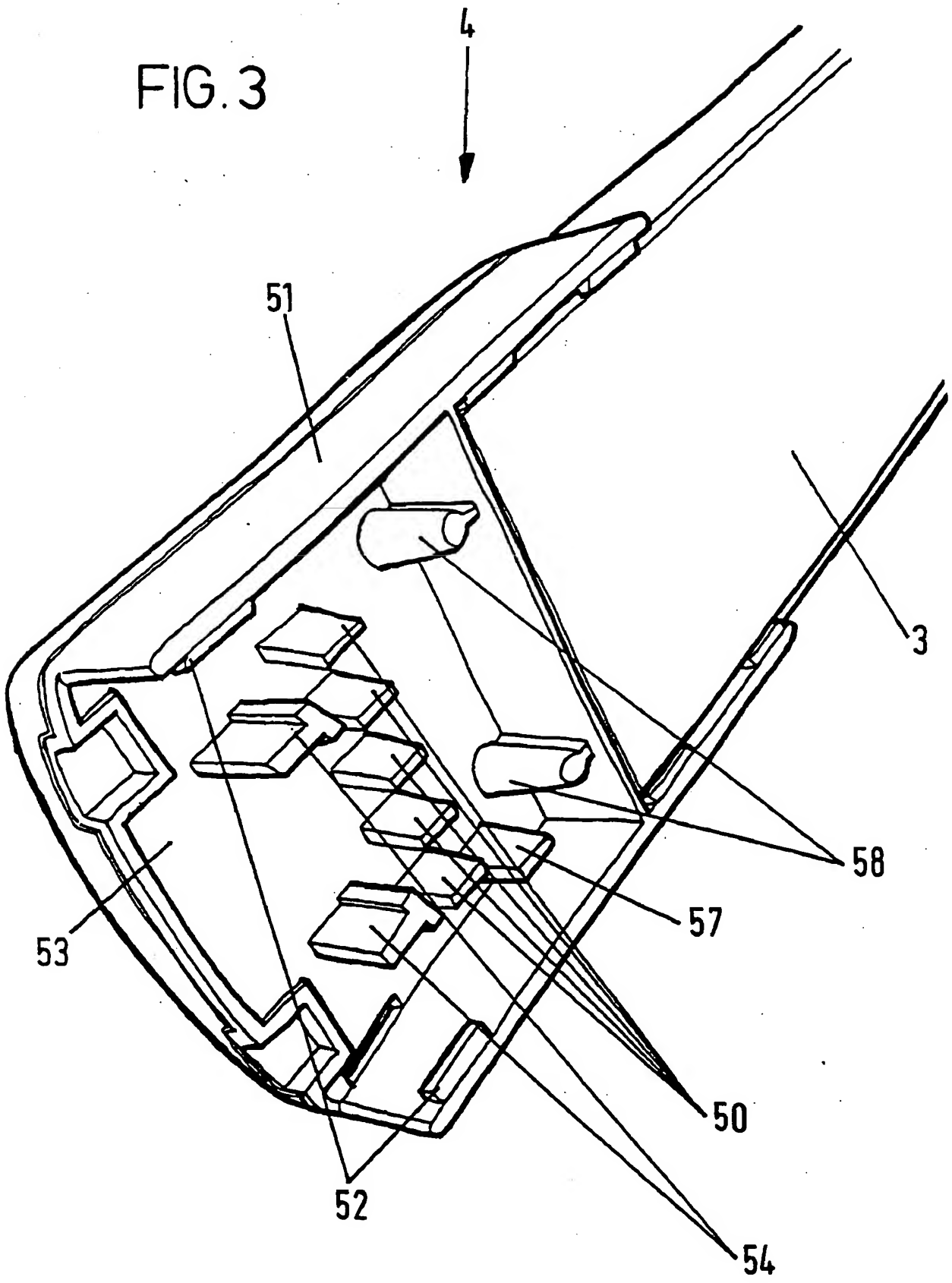


FIG. 2

FIG. 3



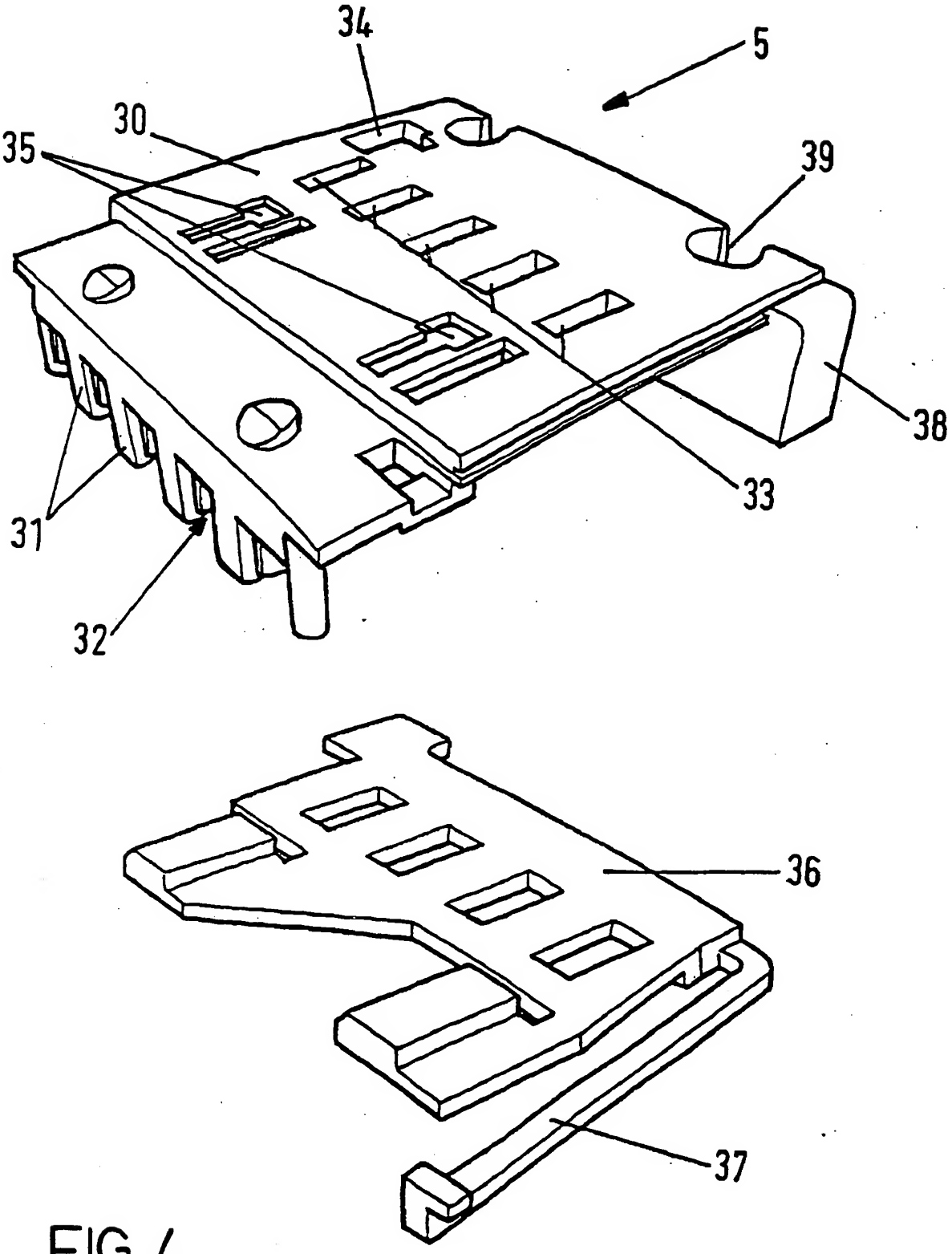


FIG. 4

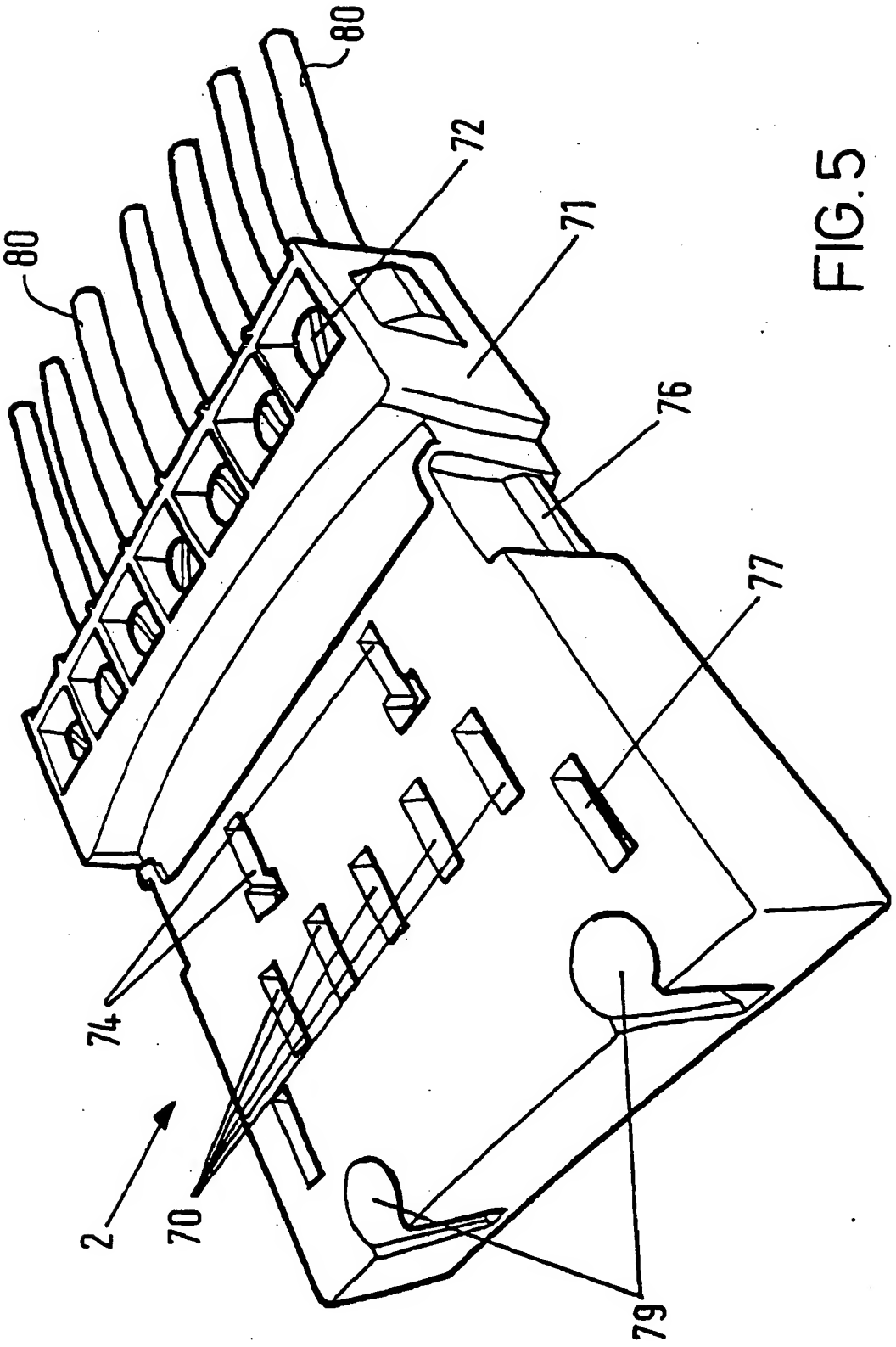


FIG.5

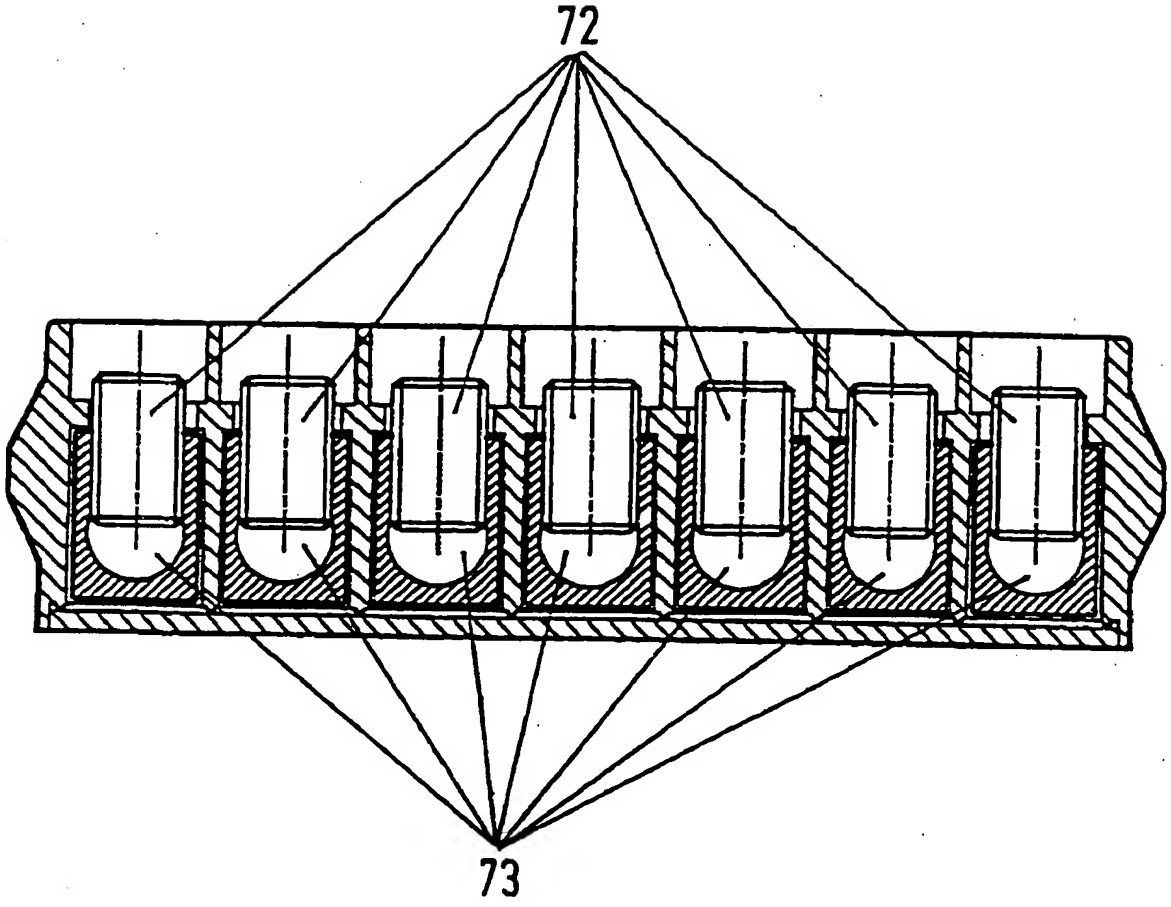


FIG. 6

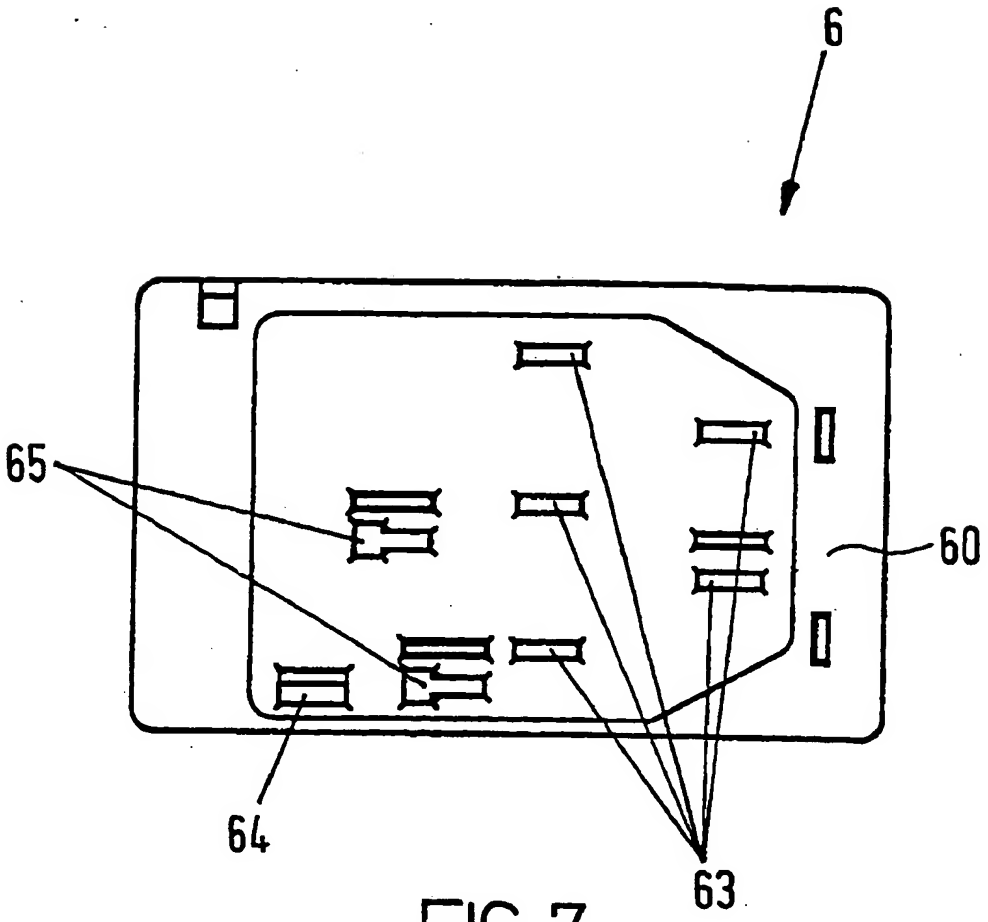


FIG. 7

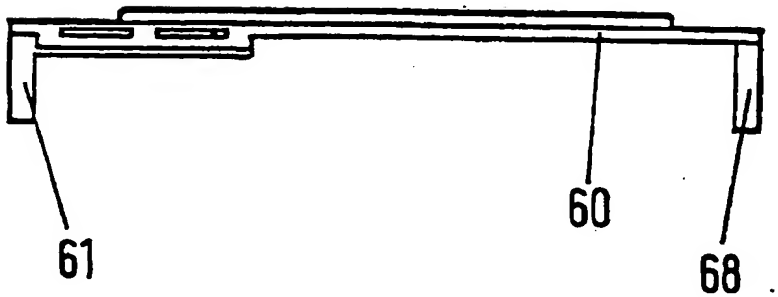


FIG. 8

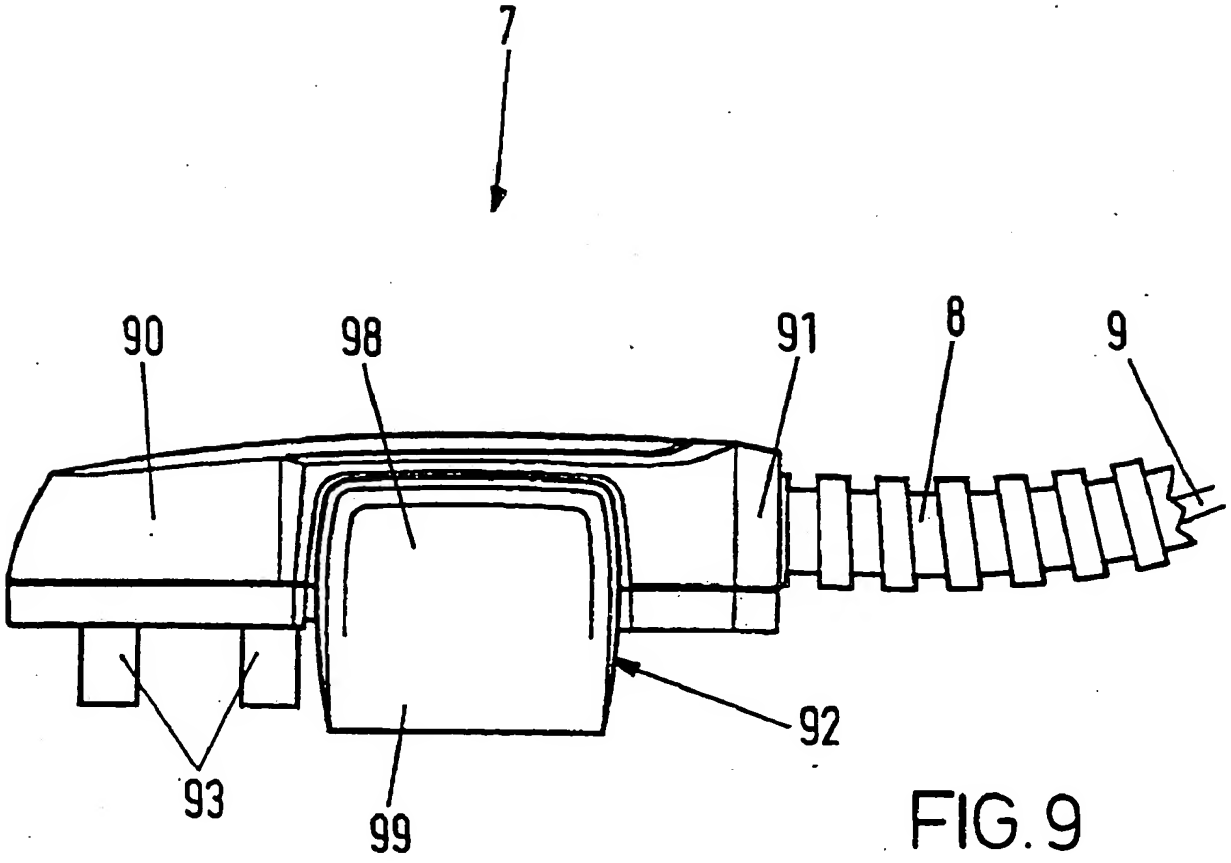


FIG. 9

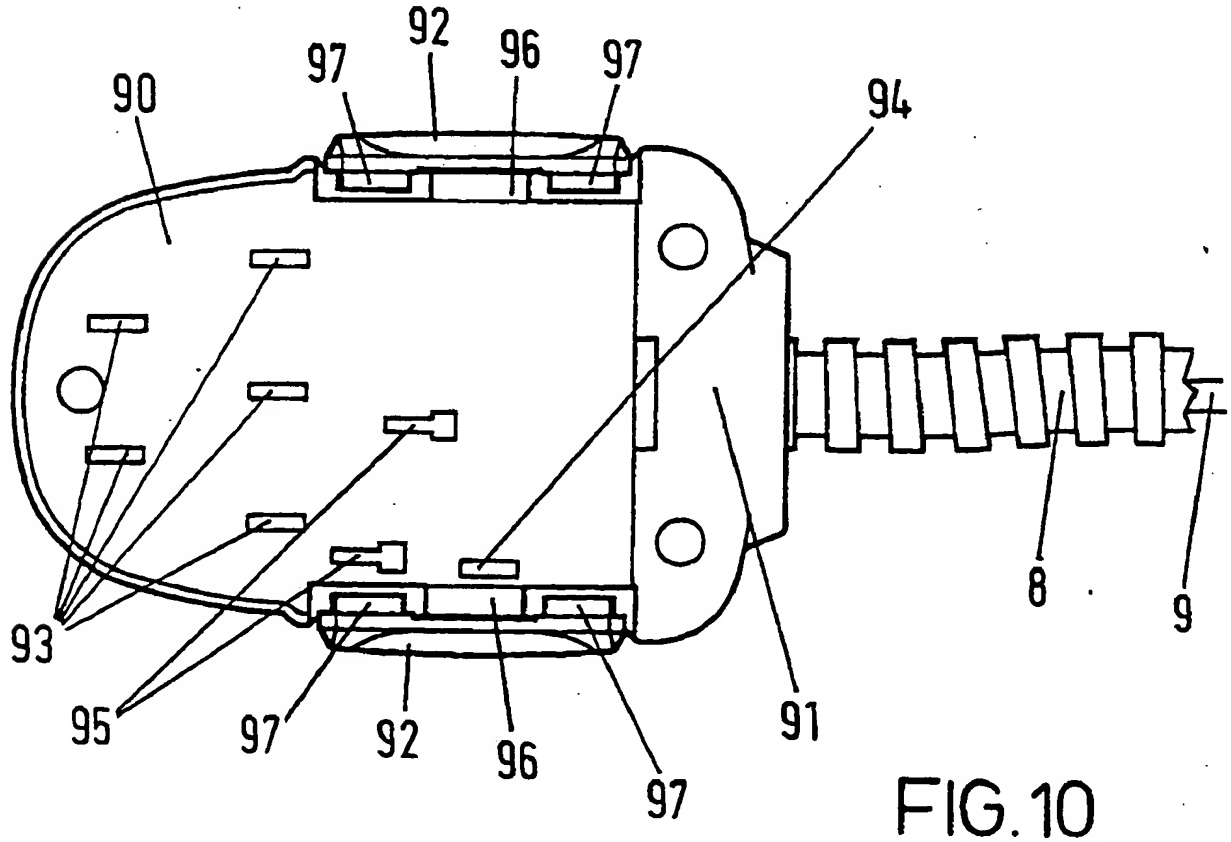


FIG. 10

MULTI-BUSBAR POWER TRACK

The present invention relates to an electrical distribution system, and in particular to a multi-busbar power track.

Busbar power tracks are known for providing a local electricity distribution system with means for connecting electrical apparatus to the system at different points. A common use for such systems is in an office or other commercial building where a number of electrical connection points are desired, and further, where the configuration and desired location of connection points is likely to change from time to time.

Busbar power tracks of the above kind are known for distributing either electrical power, or electrical communication signals. It would be advantageous to provide a power track system which is capable of distributing both a power supply and communication signals within a single power track apparatus.

Some known busbar power tracks are modular in construction and allow a number of modules to be coupled together to form a power track system of indefinite length and configuration. These known modular systems generally require the use of separate connecting units to couple respective modules together, which leads to increased assembly time on site and increased costs to the end user due to the complexity of the connections which may require the use of skilled personnel for their installation.

Another disadvantage of known busbar power tracks relates to the provision of insulating material to provide electrical insulation between each of the electrical conductors within the track. Insulating the electrical conductors with a suitable insulating material leads to higher costs and increased complexity during manufacture. Busbar power tracks are known which use air as the insulating material. However, in order to provide adequate insulation between the electrical conductors, and particularly between the conductors and the casing of the power track, it is necessary to increase the overall physical dimensions of the power track.

The present invention provides a modular busbar power track system which does not require the use of separate connecting elements and which allows the modules to be connected to each other simply and securely while maintaining the necessary electrical integrity. Further, the present invention provides a busbar power track system in which the arrangement for electrical insulation of the conductors enables the dimensions of the track to be reduced, particularly with regard to its height, and which will accommodate both power and communication signals.

According to one aspect of the present invention there is provided an electrical distribution system having a track element comprising:

an elongate casing;

a plurality of linear busbar conductors disposed within the casing;

support means for supporting said busbar conductors within said casing in a fixed mutually spaced relationship;

at least one entry point in said elongate casing for electrical access to said busbar conductors;

and plug-in connector means at each end of said casing for connecting said modular power track element to another component of said electrical distribution system having complementary plug-in connector means;

said plug-in connector means comprising male connector means at one end of the casing having an array of projecting pins; and female connector means at the other end of the casing having an array of apertures for receiving projecting pins; and complementary interlocking formations at both ends of the casing for mechanically interlocking elements of said electrical distribution system together.

The use of plug-in connector means comprising pins and interlocking formations enables rapid interconnection of the various components of the system whilst maintaining its electrical and physical integrity.

Preferably, said complementary interlocking formations comprise one or a plurality of preferably tapered locking elements disposed at one end of the casing and correspondingly-shaped apertures in the other end of the casing. Such elements ensure firm and precise interlocking of the components together.

In one embodiment of the invention, said projecting pins of said male connector means extend at one end of the casing generally at right angles to the plane thereof, and said tapered locking elements are disposed at the same said end of the casing and extend generally in the same direction as said projecting pins. This arrangement enables interlocking of the components to be completed quickly in a single movement.

Preferably, said one end of the casing comprising said male connector means is provided with a housing member, and said projecting pins are mounted in and extend from said housing member.

In another preferred embodiment of the invention, the housing member is provided with latch means for engaging another element of said electrical distribution system for further mechanical interlocking therewith.

Suitably, the projecting pins comprise conductor pins connected to said busbar conductors; and one or more shaped keyway pins. The keyway pins ensure that the male connector means of the track element can be connected only to an appropriate female connector means of another component.

Advantageously, the array of apertures of said female connector means comprises apertures in said casing aligned with said busbar conductors for receiving said conductor pins, and one or more shaped keyways for receiving correspondingly-shaped keyway pins. A safety shutter may be provided which is biassed to a rest position covering said apertures whereby access to said conductors is normally prevented, said safety shutter being adapted for opening by engagement with one or more of said shaped keyway pins.

In one embodiment of the invention, the entry point comprises an array of apertures in said casing aligned with said busbar conductors for receiving conductor pins of an appropriate tap-off connector plug, and one or more shaped keyways for receiving correspondingly-shaped keyway pins of said tap-off connector plug.

The linear busbars are suitably supported by an inner wall of said casing and are insulated from each other by an air gap. Preferably, at least said inner wall of said casing is made of conductive material and the busbar conductors are supported by said wall with the interposition of a film of electrically insulating material. Advantageously, the busbar conductors are U-shaped in cross-section. The use of U-shaped busbar supported on the wall of the casing with only a thin film of insulating material enables the casing to be designed with a very low overall height.

The electrical distribution system may further comprise a supply element adapted to provide an electrical supply to said power track element, said supply element comprising at least one terminal for receiving an electrical cable, and plug-in female connector means corresponding to the female connector means of said power track element connected to said supply terminal for receiving the male connector means of a power track element.

Preferably some of said linear busbar conductors are connected to a power supply via said supply member, and at least a further one of said linear conductors is connected to a source of data signals via said supply terminal whereby respective access points are arranged to provide access to only one or the other of said respective linear conductors.

According to another aspect of the invention, there is provided an electrical distribution system having a modular power track comprising

an elongate casing,

a plurality of linear busbar conductors disposed within the casing;

support means for supporting said linear busbar conductors within said casing in a fixed mutually spaced relationship;

at least one entry point in said elongate casing for electrical access to said busbar conductors;

and plug-in connector means at each end of said casing for connecting said modular power track element to another component of said electrical distribution system having complementary plug-in connector means,

said busbar conductors being supported by an inner wall of said casing and being insulated from each other by an air gap.

In order that the invention may be more fully understood, embodiments in accordance therewith are now described below with reference to the accompanying drawings, in which:

Fig. 1 shows a general perspective view of an electrical distribution system according to a preferred embodiment of the present invention;

Fig. 2 shows a vertical cross-section through the power track element of the electrical distribution system shown in Figure 1, taken along the line A-A in Figure 1;

Fig. 3 shows a perspective view of the male connector of the power track element of the electrical distribution system of Figure 1;

Fig. 4 shows an enlarged perspective view of the female connector of the power track element of the electrical distribution system of Figure 1, with the safety shutter shown separately;

Fig. 5 shows a perspective view of a power supply terminal of the electrical distribution system of Figure 1;

Fig. 6 shows an end view of the power supply terminal of Figure 5 viewed in the direction of arrow D in Figure 5;

Fig. 7 shows a plan view of an access point of the power track element shown in Figure 1;

Fig. 8 shows a side view of the access point shown in Figure 7;

Fig. 9 shows a side view of a tap-off connector plug of the electrical distribution system of Figure 1; and

Fig. 10 shows an underneath view of the tap-off connector plug shown in Figure 9.

Referring to the drawings, Fig. 1 shows the various elements of the electrical distribution system. These comprise a modular power track element 3 containing a plurality of current-carrying busbar conductors 21 (Fig. 2) and which incorporates a male connector 4 at one end and a female connector 5 at the other end, both electrically connected to the busbar conductors; and an entry point 6 for electrical access to the busbar; a tap-off connector plug 7; and a supply terminal 2 connected to an electrical power supply cable 1 for feeding the current-carrying busbars.

Fig. 2 shows a cross section along line A-A of Fig. 1 of the modular power track element 3. An elongate casing 10 is made up of a first and a second part 11,12. Both parts are made from resilient electrically conducting material, for example sheet steel or aluminium extrusion. Each part has a planar cover 13,14 and two side walls 15,18. The first part 11 of the casing 10 has a inwardly directed flange 16 along the free edge of each of the side walls 15. The second part 12 of the casing has an outwardly directed flange 17 on the free edge of each of its side walls 18. The outwardly directed flange 17 forms an acute angle with each of the side walls 18 of the second part 12. The two flanges 16,17 engage with each other to secure the two parts 11,12 of the casing 10 together.

Linear busbar conductors 21 (in this case five in number) are disposed within the casing 10 supported by the planar cover 14.

On the inside face of the planar cover 14 there is a thin film of electrically insulating material 20. Suitable materials for the thin film are PVC or a polycarbonate although other similar plastics or resin materials such as NORYL (Registered Trade Mark) may be used. Each busbar conductor 21 has a substantially U-shaped cross section, with each side arm of the U rolled over to face towards each other, so that when viewed from the direction of arrow A of Fig. 2, each conductor 21 forms a linear bar with a continuous slot 22 disposed in it.

Spacers 25 made from an electrically insulating material extend across the full width of the casing 10. Each spacer 25 has a main body portion 26 from which depend a plurality of locating pegs 27. Each locating peg 27 projects into a continuous slot 22 in a busbar 21 and is located between the walls of the busbar. The main body portion of the spacer 25 rests on top of the linear conductors. The length of the spacer is substantially less than its width across the casing 10 and in preferred embodiments of the present invention a number of spacers 25 are situated along the length of the power track element 3 such that if a force is applied to the planar elements 13,14 of the casing 10, the casing is prevented from deflecting into contact with the busbar conductors 21. The busbars are otherwise insulated from each other by an air gap.

The use of U-shaped conductors which are supported directly on the cover 14 with the interposition of only a thin film of insulating material substantially reduces the overall height of the assembly whilst maintaining the electrical integrity of the system.

Fig. 3 is a view of the underside of the male connector 4 and adjacent portion of the casing 10. The male connector 4 comprises a housing 51 having two side walls connected by a cover portion 53. Depending from the cover portion 53 are two locating keys 54. The locating keys 54 have a configuration which substantially matches the keyways 35 of the female connector 5 (Fig.4). Also depending from the housing 51 are a plurality of conductor pins 50. Each of the conductor pins 50 is substantially rectangular in shape and the pins are made of any suitable conducting material, although preferably of the same conducting material as that of the busbar conductors 21, e.g. copper. In preferred embodiments of the present invention there may be provided between two and up to five of the conductor pins. A wall 56 is located approximately equidistant the length of the housing 51 and abuts the end of the casing 10 with its busbars to which the conductor pins are connected. Interlocking formations in the form of a pair of tapered locking pins 58 are formed on the face of wall 56. These pins have substantially the same configuration as the corresponding tapered apertures 39 of the female connector 5 shown in Fig. 4. An inter-connect element 57 similarly depends from the bridging portion 53 of the housing 51. This interconnect element 57 is connected to the metallic walls of the casing 3 and provides for earth continuity in the case where the casing is used as an earth

conductor. The conductor pins 50, locating keys 54 and inter connect element 57 are spatially arranged in a matching configuration to the keyways 35 and apertures 33,34 of the female connector 5. Each of the conductor pins 50 and the inter connect element 57 are provided with internal conducting connections such that they are electrically connected to the linear busbar conductors 21 of the conductor assembly 3. Disposed on the two side walls of the housing 51 are latch elements 52 which may for example be of elongate triangular section.

Fig. 4 shows an enlarged and exploded view of the female connector 5. Depending from a main body 30 of insulating material are a number of supporting tabs 31 which rest against the insulating material 20 of the casing 10 and support the main body 30. Each supporting tab 31 is distanced from a neighbouring supporting tab to provide a gap 32 which is substantially the same width as one of the linear busbar conductors 21. Provided in the main body 30 are a number of apertures 33. Each of the apertures is located in the main body 30 on the centre line of each gap 32 so that the aperture is directly over the slot 22 of the linear busbar conductor 21 located in that gap 32. A further aperture 34 is provided which is located above a metal clip (not shown) which is in contact with the casing 10 of the connector assembly. There are also a plurality of keyways 35 located in the main body 30 which are apertures of a pre-determined configuration and which are intended to co-operate with locating keys 54 on the male connector of another track element.

On the same side of the body 30 as supporting tabs 31 is provided a planar safety cover 36, shown in separated in Fig. 4. The safety cover 36 is retained against the main body 30 by a number of retaining tabs (not shown) which allow the safety cover to move only in the plane of the main body 30. The safety cover is moulded from plastics material and has an integral elongate spring element 37 extending from it in the same plane as the safety cover at an angle thereto and which abuts against the face of end block 38 depending from the main body 30. The safety cover has a number of apertures in it corresponding to the apertures 33,34 and keyways 35 of the main body 30. The elongate spring element 37 biasses the safety cover towards a rest position. When the safety cover is in the rest position the apertures in the safety cover do not align with the apertures

33,34 and keyways 35 of the main body 30, thus preventing access to the linear conductors and making the female connector electrically safe.

The end block 38 is a solid, linear element extending across the full width of the main body 30. Located in the end block are two interlocking formations in the form of shaped apertures 39 which match the shape of tapered locking pins 58 in male connector 4.

An embodiment of the supply terminal 2 is shown in Figs. 5 and Fig. 6. The supply terminal 2 is substantially rectangular in shape, with an enlarged portion 71 at one end and is moulded from plastics material. The enlarged portion 71 has a plurality of metal cable terminals 73 mounted therein, as best seen in Fig. 6. In the preferred embodiment shown there are seven cable terminals 73. Fig. 6 is an end view of the supply terminal 2 when viewed from direction shown by arrow D on Fig. 5. Mounted within recesses formed in the top surface of the enlarged portion 71 are a plurality of cable clamping screws 72. The clamping screws 72 extend from the upper surface of the enlarged portion 71 into respective cable terminals 73 such that when a conducting cable 80 is inserted into one of the cable terminals 73 the cable clamping screws 72 both physically restrain the conducting cable and make an electrical connection.

In the remaining portion of the supply terminal 2 on the upper surface there are provided keyways 74, apertures 70 and 77 and securing apertures 79 which are spatially arranged in a matching fashion to the keyways, apertures and securing aperture of the female connector 5 and in a matching fashion to the locating keys 54, conductor pins 50, inter connect element 57 and securing elements 58 of the male connector 4. Within each of the apertures 70 are located conducting elements (not shown) of the same configuration as the linear busbar conductors 21 of the conducting assembly 3, which are electrically connected to respective cable clamping elements 72. Depending from opposing side walls of the supply terminal 2 are detents 76 which are arranged to engage with the latch elements 52 of the male connector 4 and are substantially the same as detents 40 provided on the end block 38 of the female connector 5, as shown in Fig. 3.

Fig. 7 shows a plan view of an access point 6 according to an embodiment of the present invention. Keyways 65, apertures 63 and 64 are provided as described with reference to the corresponding elements of the supply terminal 2 and the female connector 5. However, the keyways 65 and apertures 63, 64 are arranged in a different spatial configuration from those in the supply terminal 2 and female connector 5. The access point 6 is, otherwise, of a similar construction to the female connector 5 having a main body 60 of plastics material, a safety cover (not shown), and end tabs 61. However, depending from the main body 60 at the opposite end thereof from the end tabs 61 are provided identical second end tabs 68 of the same arrangements and configuration of the end tabs 61. This is illustrated in Fig. 8. The access point 6 is located in a suitable aperture in the casing 10 and is retained therein by end tabs 61,68.

On installation, the individual cables 80 within a multi-cord cable 1 are inserted into respective cable terminals 73 of the supply terminal 2 and secured by the cable clamping screws 72, thereby electrically connecting the individual cables to respective conducting portions located within apertures 70 and 77 of the supply terminal 2. A first modular track element 3 is connected to the supply terminal 2 by plugging in the male connector 4. The male connector 4 is positioned vertically above the supply terminal 2 such that the locating keys 54, conductor pins 50 and inter connect element 57 are aligned with the keyways 74 and apertures 77 and 70. When in this position, the tapered locking pins 58 will also be aligned with the shaped apertures 79. The male connector 4 and the supply terminal 2 are brought into engagement with one another, maintaining the alignment of the various elements, so that the locating keys 54 are inserted into the keyways 35, the conductor pins are inserted into the apertures 70, the inter connect element 57 is inserted into aperture 77 and the tapered locking pins 58 are located within the shaped apertures 39. The conductor pins 50 are of a slightly larger dimension than the slots in the conducting elements within apertures 70. Therefore, as the conductor pins are inserted into the slots, the arms of the conducting elements are forced slightly apart and grip the pins 50 forming a good electrical connection. In this manner an electrical connection is provided from the cores of the multi-cored cable 1 via a cable terminal 72 to the portions of the linear conductors located within apertures 70, via the pins 50 to the busbar conductors 21 located within the power track element.

The latch elements 52 of the male connector 4 engage with the detents 76 of the supply terminal and the tapered locking pins 58 fully engage in the shaped apertures 79 to reliably secure the male connector 4 to the supply terminal 2 such that it is difficult to accidentally disconnect the male connector and the supply terminal. Generally, this can only be achieved using a tool to urge the side walls of the housing 51 of the male connector away from the respective side walls of the supply terminal 2 such that the latch elements 52 move out of engagement with the detents 76.

A further power track element 3' may be connected to the first power track element 3 by connecting the male connector 4' of the further track element 3' to the female connector 5 of the first track element 3. As the keyways 35, apertures 33,34 and securing apertures 39 of the female connector 5 have the same configuration as those in the supply terminal 2, the male connector 4' of the further track element 3' connects to the female connector 5 of the first track element 3 in the same manner as the male connector 4 of the first track element 3 connects to the supply terminal 2, except in this case the conductor pins of the male connector enter directly into the slot 22 of the respective busbar conductor 21. Any number of further power track elements 3' may be consecutively connected to each other in this manner such that an overall distribution system of any required length may be formed.

Figs. 9 and 10 show a tap-off connector 7 according to an embodiment of the present invention. The tap-off connector 7 includes an outer casing 90 connected to which is a protective cable sheath 8, which may be an articulated metal sheath as is well known in the art. Inside the sheath 8 there is an auxiliary cable 9 of a substantially similar nature to the supply cable 1 described hereinbefore. The auxiliary cable 9 and protected sheath 8 are connected to the outer casing 90 by a tension relief device apparatus 91. Depending from respective side walls of the outer casing 20, and substantially opposite each other, are securing clips 92. Depending from the underside of the outer casing 90 are a plurality of tap-off conductor pins 93, a number of locating keys 95, and an inter connect element 94. Each securing clip 92 is connected to a respective side wall of the outer casing 90 by means of a resilient element 96 such that the securing clip effectively pivots about the resilient element 96. Provided that a lower portion 99 of each securing

clip 92 there are a number of latch elements 97, the latch elements 97 of each respective securing clip 92 projecting towards each other in a direction towards the centre of the tap-off connector 7. The tap-off conductor pins 93, inter connect element 94 and locating keys 95 are spatially arranged in an identical manner to the apertures 63,64 and keyways 65 of the access point 6 shown in Fig. 7. However, the differences in the spatial arrangement of these elements compared to the male and female connectors make it impossible to connect a tap-off connector 7 to a female connector 5 of a track element 3.

Not all of the tap-off conductor pins 93 shown in the Figs. 9 and 10 may necessarily be provided, and those which are provided are electrically connected to respective individual cables within the auxiliary cable 9 within the outer casing 90 of the tap-off connector 7.

In use it may be required to connect auxiliary electrical equipment or terminating sockets to the track element 3. This may be achieved by connecting the required equipment or terminating sockets through the auxiliary cable 9 of the tap-off connector 7 and inserting the tap-off connector 7 into a convention access point 6. The tap-off connector 7 is firmly inserted into the access point 6 such that the latch elements 97 of the securing clips 92 engage with the two flanges 16,17 of the outer casing 10 of the power track element 3. The tap-off connector 7 may be disengaged from the access point 6 by squeezing together the upper portions 98 of the securing clips 92.

In embodiments of the invention the track element 3 may be used to carry two separate electrical supplies, for example, two power supply each using three of the six busbar conductors, or one power supply adn one data supply. Separate access points 6 are provided for connecting to each respective supply, the configuration of the keyways 65 of the access ports 6 being different for each power supply. Tap-off connectors 7 are provided for each respective electrical supply and will have correspondingly differently configured tap-off locating keys 95 which only match the configuration of the keyways 65 of the access point 6 which is connected to the corresponding supply. In this way it is not possible to connect a tap-off connector 7 which is configured for a first supply to the access point 6 which is configured for a second power supply.

CLAIMS

1. An electrical distribution system having a modular power track element comprising

an elongate casing;

a plurality of linear busbar conductors disposed within the casing;

support means for supporting said busbar conductors within said casing in a fixed mutually spaced relationship;

at least one entry point in said elongate casing for electrical access to said busbar conductors;

and plug-in connector means at each end of said casing for connecting said modular power track element to another component of said electrical distribution system having complementary plug-in connector means;

said plug-in connector means comprising male connector means at one end of the casing having an array of projecting pins; and female connector means at the other end of the casing having an array of apertures for receiving projecting pins; and complementary interlocking formations at both ends of the casing for mechanically interlocking elements of said electrical distribution system together.

2. An electrical distribution system as claimed in Claim 1, wherein said complementary interlocking formations comprise one or a plurality of locking elements disposed at one end of the casing and correspondingly-shaped apertures in the other end of the casing.

3. An electrical distribution system as claimed in Claim 2, wherein said projecting pins of said male connector means extend at one end of the casing generally at right angles to the plane thereof, and said locking elements are disposed at the same said end of the casing and extend generally in the same direction as said projecting pins.

4. An electrical distribution system as claimed in any of Claims 1 to 3, wherein said one end of the casing comprising said male connector means is provided with a housing member, and said projecting pins are mounted in and extend from said housing member.

5. An electrical distribution system as claimed in Claim 4, wherein said housing member is provided with latch means for engaging another component of said electrical distribution system for further mechanical interlocking therewith.

6. An electrical distribution system as claimed in any of Claims 1 to 5, wherein said projecting pins comprise conductor pins connected to said busbar conductors; and one or more shaped keyway pins.

7. An electrical distribution system as claimed in Claim 6, wherein the array of apertures of said female connector means comprises apertures in said casing aligned with said busbar conductors for receiving said conductor pins, and one or more shaped keyways for receiving correspondingly-shaped keyway pins.

8. An electrical distribution system as claimed in Claim 7, wherein a safety shutter is provided which is biassed to a rest position covering said apertures whereby access to said conductors is normally prevented, said safety shutter being adapted for opening by engagement with one or more of said shaped keyway pins.

9. An electrical distribution system as claimed in any one of the preceding claims, wherein said entry point comprises an array of apertures in said casing aligned with said busbar conductors for receiving conductor pins of an appropriate tap-off connector plug, and one or more shaped keyways for receiving correspondingly-shaped keyway pins of said tap-off connector plug..

10. An electrical distribution system as claimed in any one of the preceding claims, wherein said linear busbar conductors are supported by an inner wall of said casing and are insulated from each other by an air gap.

11. An electrical distribution system as claimed in Claim 10, wherein at least said inner wall of said casing is made of conductive material and the busbar conductors are supported by said wall with the interposition of a film of electrically insulating material.

12. An electrical distribution system as claimed in Claim 1, wherein said busbar conductors are U-shaped in cross-section.

13. An electrical distribution system as claimed in any one of the preceding claims, further comprising a supply element adapted to provide an electrical supply to said power track element, said supply element comprising at least one terminal for receiving an electrical cable, and plug-in female connector means corresponding to the female connector means of said power track element connected to said supply terminal.

14. An electrical distribution system as claimed in Claim 13, wherein said supply element comprises interlocking formations for receiving complementary interlocking formations of a power track element.

15. An electrical distribution system having a modular power track comprising

an elongate casing,

a plurality of linear busbar conductors disposed within the casing;

support means for supporting said linear busbar conductors within said casing in a fixed mutually spaced relationship;

at least one entry point in said elongate casing for electrical access to said busbar conductors;

and plug-in connector means at each end of said casing for connecting said modular power track element to another component of said electrical distribution system having complementary plug-in connector means,

said busbar conductors being supported by an inner wall of said casing and being insulated from each other by an air gap.

16. An electrical distribution system as claimed in Claim 13, wherein at least said inner wall of said casing is made of conductive material and the busbar conductors are supported by said wall with the interposition of a film of electrically insulating material.

17. An electrical distribution system substantially as hereinbefore described with reference to Figs. 1 to 10 of the accompanying drawings.

CLAIMS

1. An electrical distribution system having a modular power track element comprising

an elongate casing;

a plurality of linear busbar conductors disposed within the casing;

support means for supporting said busbar conductors within said casing in a fixed mutually spaced relationship;

at least one entry point in said elongate casing for electrical access to said busbar conductors;

and plug-in connector means at each end of said casing for connecting said modular power track element to another component of said electrical distribution system having complementary plug-in connector means;

said plug-in connector means comprising male connector means at one end of the casing having an array of projecting pins; and female connector means at the other end of the casing having an array of apertures for receiving projecting pins; and complementary interlocking formations at both ends of the casing for mechanically interlocking elements of said electrical distribution system together.

2. An electrical distribution system as claimed in Claim 1, wherein said complementary interlocking formations comprise one or a plurality of locking elements disposed at one end of the casing and correspondingly-shaped apertures in the other end of the casing.

3. An electrical distribution system as claimed in Claim 2, wherein said projecting pins of said male connector means extend at one end of the casing generally at right angles to the plane thereof, and said locking elements are disposed at the same said end of the casing and extend generally in the same direction as said projecting pins.

4. An electrical distribution system as claimed in any of Claims 1 to 3, wherein said one end of the casing comprising said male connector means is provided with a housing member, and said projecting pins are mounted in and extend from said housing member.

5. An electrical distribution system as claimed in Claim 4, wherein said housing member is provided with latch means for engaging another component of said electrical distribution system for further mechanical interlocking therewith.

6. An electrical distribution system as claimed in any of Claims 1 to 5, wherein said projecting pins comprise conductor pins connected to said busbar conductors; and one or more shaped keyway pins.

7. An electrical distribution system as claimed in Claim 6, wherein the array of apertures of said female connector means comprises apertures in said casing aligned with said busbar conductors for receiving said conductor pins, and one or more shaped keyways for receiving correspondingly-shaped keyway pins.

8. An electrical distribution system as claimed in Claim 7, wherein a safety shutter is provided which is biassed to a rest position covering said apertures whereby access to said conductors is normally prevented, said safety shutter being adapted for opening by engagement with one or more of said shaped keyway pins.

9. An electrical distribution system as claimed in any one of the preceding claims, wherein said entry point comprises an array of apertures in said casing aligned with said busbar conductors for receiving conductor pins of an appropriate tap-off connector plug, and one or more shaped keyways for receiving correspondingly-shaped keyway pins of said tap-off connector plug..

10. An electrical distribution system as claimed in any one of the preceding claims, wherein said linear busbar conductors are supported by an inner wall of said casing and are insulated from each other by an air gap.

11. An electrical distribution system as claimed in Claim 10, wherein at least said inner wall of said casing is made of conductive material and the busbar conductors are supported by said wall with the interposition of a film of electrically insulating material.

12. An electrical distribution system as claimed in Claim 1, wherein said busbar conductors are U-shaped in cross-section.

13. An electrical distribution system as claimed in any one of the preceding claims, further comprising a supply element adapted to provide an electrical supply to said power track element, said supply element comprising at least one terminal for receiving an electrical cable, and plug-in female connector means corresponding to the female connector means of said power track element connected to said supply terminal.

14. An electrical distribution system as claimed in Claim 13, wherein said supply element comprises interlocking formations for receiving complementary interlocking formations of a power track element.

15. An electrical distribution system substantially as hereinbefore described with reference to Figs. 1 to 10 of the accompanying drawings.

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Claims searched: 1-14 **Date of search:** 7 June 1999

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Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.Q): H2E(ECJC,ECJP)

Int Cl (Ed.6): H01R-25/00;25/14;25/16

Other: Online databases: WPI,EPODOC

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X	GB 2 292 489 A	(Aphel) - see fig 1 and abstract	1 at least
X	GB 2 276 504 A	(Modelec) " " " "	"
X	GB 2 012 497 A	(Cary) - see whole document	"
X	WO 87/07985 A1	(MBA) - see claims and Fig	"
X	US 5,788,521	(Milan) - see claims and Fig 1 at least	"
Y	US 5,582,522	(Walter)- see whole document	"

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
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